Section 1B

Standard Operating Procedures for Receiving Environment Sampling
v1 May 2008

Standard Operating Procedure
Meadowbank Study Lakes & Baker Lake
Water & Phytoplankton Sampling 2008

GENERAL:

Project Coordinator:
Maggie McConnell
Azimuth Consulting Group Inc.
218-2902 West Broadway
Vancouver, BC, V6K 2G8
Telephone: 604-730-1220
Fax: 604-739-8511
Email: mmcconnell@azimuthgroup.ca

In case of **emergency**, contact Gary Mann (Azimuth telephone number 604-730-1220 or cell phone 604-908-0601).

LOCATION AND TIMING FOR FIELD ACTIVITIES:

Ten sampling stations have been chosen for water quality monitoring in the Meadowbank study lakes are and Baker Lake. These stations (with their corresponding abbreviation) are:

- Third Portage Lake – North Basin (TPN)
- Third Portage Lake – East Basin (TPE)
- Third Portage Lake – South Basin (TPS)
- Second Portage Lake (SP)
- Tehek Lake (TE)
- Wally Lake (WAL)
- Inuggugayualik Lake (INUG)
- Baker Lake – Barge Dock (BBD)
- Baker Lake – Proposed Jetty (BPJ)
- Baker Lake – Akilahaarjuk Point (BAP)

The **target water depth** at each sampling station is approximately 8 to 12 meters; Wally Lake is the exception, with a total water depth of approximately 6 meters (target water depth is 5 to 6 meters). The **UTM coordinates** for each sampling station, measured using a GPS unit in NAD 83, and the range of water depths found at each station are presented in the following table:

Sampling Station	Easting	Northing	Water Depth (m)
TPN	14W 636503	7215322	11.3
TPE	14W 0638738	7211300	12.4
TPS	14W 633840	7208079	15.1
SP	14W 639832	7213979	18.4
TE	15W 360061	7212182	8.2
WAL	15W 360424	7221343	6.0

INUG	14W 622843	7216842	7.6
BBD	14W 644467	7135221	12.8
BPJ	15W 357188	7134092	11.5
BAP	15W 363884	7131039	16.5

Field activities are scheduled for three times per year. The first sampling will take place in the spring just after ice-off, in **early July**. The second in **late August**, and the third in **mid September**.

WATER CHEMISTRY & PHYTOPLANKTON SAMPLING:

1. Gather **field collection materials**:
   In the boat:
   - Field collection data forms, pencils, waterproof markers & clipboard
   - GPS unit, batteries
   - Water pump & 12V battery
   - Tubing (8 meter length and 1 meter length) & weight (& extra C-clamps and cable ties)
   - Water filter apparatus, hand-held vacuum pump, tweezers
   - YSI meter, batteries
   - Secchi disk
   - pH meter, batteries
   - Depth meter, batteries
   - Bucket
   - Rope
   - Sampling gloves
   - Field sample bottles & preservatives (per sampling station):
     - 1 – 1 L plastic
     - 1 – 250 mL amber glass
     - 2 – 125 ml amber glass
     - 1 – 250 mL plastic
     - 2 – 500 mL amber glass
     - 1 – 125 mL amber glass (narrow black lid)
     - Ashless filter, tinfoil, ziploc plastic bag
     - 1 vial nitric acid
     - 2 vial hydrochloric acid
     - 3 vial sulfuric acid
     - 1 syringe & magnesium carbonate slurry
     - 1 syringe & Lugol's solution
   - Extra sample bottles in case of breakage or loss
   - QA/QC field duplicate sampling containers & preservatives (same as above), at one randomly selected sampling station per sampling event

   In camp:
   - Labels for sampling containers
   - Coolers (for storing and shipping samples)
   - Ice packs (for shipping samples to laboratories)
   - Address labels for coolers
   - Chain-of-custody forms

- Large Ziploc bags (for sending chain-of-custody form in cooler)
- Packing tape (for affixing labels to sampling containers & sealing cooler)

2. Before going into the field, **label** all **sampling containers** (including one ziploc bag for chlorophyll a filter). Using a permanent waterproof marker, fill in the labels with the following information:
   - Azimuth company name
   - Station abbreviation (e.g. TPE, INUG)
   - Date of sample collection
   - Parameters to be measured from individual bottle (conventionals, total metals, etc.)
   - Type and amount of preservatives

   The following table lists the specific bottles to be filled, parameters to be measured and preservatives required for each. Affix the labels to the sampling containers and then wrap packing tape around the labels to ensure a waterproof seal.

Sampling Container	**Parameters to be Measured**	**Preservatives to be Added**
1 L plastic	Conventionals*	None
250 mL amber glass	TKN, Ammonia	1 vial of sulfuric acid
1 filter (of 1 L water)	Chlorophyll-a	1-2 drops of magnesium carbonate slurry in water for last of filtering; wrap filter in tinfoil and place in ziploc bag
250 mL plastic	Total Metals	1 vial of nitric acid
125 mL amber glass	TOC	1 vial of hydrochloric acid
125 mL amber glass	DOC	1 vial of hydrochloric acid
2 x 500 mL amber glass	Oil and Grease	2 vial of sulfuric acid
125 mL amber glass (narrow black lid)	Phytoplankton	1 mL of Lugol's solution per 125 mL sample

* includes: hardness, conductivity, pH, TDS, TSS, nutrients (nitrate, nitrite, orthophosphate and total phosphate), chloride, sulfate, alkalinity (bicarbonate, carbonate & hydroxide).

3. For **QAQC** purposes, one field duplicate is collected per sampling event. All parameters measured in the original sample are measured in the field duplicate. The sampling station is selected randomly from one of the seven stations, and labeled as station DUP. Prepare the QAQC labels and affix to the sampling containers, as described in step 2.

4. Before and during sampling fill in the requested information on the **field data form**; complete one field data form in its entirety for each sampling station and sampling event. Forms are made of waterproof paper; **print** all information on the form using a **lead pencil** or a write-in-the-rain pen.

5. With the aid of a GPS unit, **navigate the boat** to the sampling station using the UTM coordinates (in NAD 83) provided. Approach the station from downstream of the wind direction. In windy conditions, anchor the boat upstream of the station and drift back; it is not necessary to anchor the boat in calm conditions providing the boat remains in the same

position. Do not allow the anchor to drag through the sampling station. Record the exact UTM coordinates on the field data form.

6. Measure the **water depth** at the sampling station using the 'Hawkeye' hand-held depth meter (note: place depth meter in water ***before*** pushing ON button). Hold the meter in the water, facing the lake bottom, until the meter measures the depth. Record this information on the field data form.

7. Measure the **light attenuation** at the sampling station using the Secchi disk. Lower the disk into the water, on the shady side of the boat, so that you can no longer see it. Slowly raise the disk to the point that you can see it and measure this depth using the markings on the disk rope.

8. Measure the **pH** of the water at the sampling station using the pH meter. Hold the probe portion of the meter in the lake until the meter measures the pH. Record this information on the field data form.

9. Lower the YSI probe into the lake to just below the water surface level. Measure the **temperature**, **conductivity** and **dissolved oxygen** concentrations in the water and record on the field data form. Lower the meter to a depth of 1 m and record the field measurements. Allow the concentrations on the meter to stabilize for 10 to 15 seconds before recording the concentrations. Continue recording the field measurements at 1 m depth intervals until you reach the whole metre mark above the lake bottom (i.e. if the lake depth is 9.3 meters, record field measurements up to a depth of 9 meters).

10. Set up the **water pump** in the boat; attach the tubing to the pump using the C-clamps and attach the 12V battery. Attach the 8 meter length of tubing to the intake valve, and the 1 meter length to the output valve. Attach the ball weight to the end of the 8 meter length of tubing. Lower the 8 meter length of tubing into the water about half way (i.e., at 4 meters depth) and place the 1 meter length of tubing over the edge of the boat. Run the pump for **2 minutes** to flush the sampling device.

11. For each sampling station, **fill** the required **pre-labeled sampling containers** with water from the 1 meter length of tubing. **Add** the **specified preservatives** to the appropriate sampling containers (according to the information on the labels and table in step 2), seal and mix thoroughly by turning upside down and then upright a number of times.

12. Rinse all sections of the water filter apparatus with site water. Using the tweezers, place an ashless filter paper on the screen in the water filter apparatus, then screw the two sections together and attach the hand-held vacuum pump. **Filter 1 L of water** through the water filter apparatus. *Add 1 – 2 drops of magnesium carbonate slurry to the last few ml of water and pump through the apparatus and filter paper*. Wrap the filter paper in a piece of tinfoil, then place the filter in the pre-labeled ziploc bag.

13. Until ready for shipping, the **water samples** are stored **chilled** (on ice) in a cooler or in a refrigerator in camp, if space is available. Ice can usually be obtained from the local

surroundings in early July. The **filter** for chlorophyll-a analysis must be **frozen**; store this bag in a deep freezer in the camp. The labels on the water sampling containers may be wrapped in packing tape and the bottles put in plastic bags prior to storage on ice to protect the labels from water damage. The **phytoplankton samples** are stored at **room temperature**. Seal these jars with electrical tape; the jars tend to leak.

14. If this sampling station is selected as the QAQC **field duplicate**, collect a second set of water samples (repeat step 10), fill the pre-labeled sampling containers (repeat step 11) and collect a second filtered chlorophyll a sample (step 12). Record which sampling station the QAQC samples are collected from on the appropriate field data form.

15. Fill out a **chain-of-custody** form for the water samples and filters being sent to **ALS Environmental**. The COC form must be completed carefully and in its entirety to ensure proper analysis. This includes listing all of the specific conventional parameters (see table in step 2), Azimuth and ALS contact names, and checking off all of the specific boxes for requested analyses. The ALS laboratory quote number (**ALSEQ 07-622**) must be printed on the COC form to ensure proper billing.

    A digital COC form is available; this form can be filled out in advance to ensure accuracy and efficiency and amended in the field as required. Note that using a digital copy of the COC requires printing 2 copies of the document in the field (one for the laboratory, one for Azimuth). Ensure printing services are available in camp prior to using the digital version of the form. Any questions regarding the COC form should be directed to the Azimuth project coordinator – Maggie McConnell. Put the completed COC form in a sealed ziploc plastic bag in a cooler with the water samples.

16. Fill out a **chain-of-custody** form for the phytoplankton samples being sent to **Plankton R Us Inc.**, Winnipeg, MB. Complete all of the required fields and then put the form in a sealed ziploc plastic bag in the cooler with the phytoplankton samples.

PACKAGING & SHIPPING SAMPLES:

1. Ensure all **water samples** are **sealed** securely. **Pack** water sampling containers upright in coolers with ice packs, and packing material, to ensure samples do not spill or break during transport. (Ideal storage and transport temperature is 4°C).

2. Ensure the COC form is enclosed and then seal the cooler(s). **Label the cooler**(s) with the following address:

   ALS Environmental
   1988 Triumph Street
   Vancouver, BC, Canada
   V5L 1K5
   Tel: 604-253-4188
   Attention: Natasha Marcovic-Mirovic

3. Ensure **phytoplankton samples** are **sealed** securely and **pack** in a cooler with packing material to ensure samples do not break during transport. It is not necessary to keep samples cool.

4. Ensure the COC form is enclosed and then seal the cooler. **Label the cooler** with the following address:

   Dr. David Findlay
   Plankton R Us Inc.
   39 Alburg Drive
   Winnipeg, MB
   R2N 1M1
   Tel: 204-254-7952

5. **Ship** the water **samples** to ALS Environmental as quickly as possible. Ship the phytoplankton samples to Dr. D. Findlay when convenient.

6. Notes about shipping with **Calm Air Cargo**: 1) ask for ***Priority*** shipping with Calm Air ***AND*** with Air Canada from Winnipeg, 2) ask to charge bill to ***AEM***, 3) be sure to include contact name and phone # on the ***cooler label*** and on the ***waybill***; and text saying that they will call lab upon arrival should also be on waybill, 4) keep a copy of the waybill # and follow up with the Winnipeg Calm Air Cargo office [Chris or Karla at: **(204) 956-6101**], 5) follow up with respective labs to be sure they received notice of shipment arrival and that they've sent a courier to pick up from **Air Canada Cargo**.

7. Send completed **COC forms** and **field data forms** to **Azimuth** Consulting Group Inc., attention the project coordinator – Maggie McConnell.

Standard Operating Procedure
Meadowbank Study Lakes & Baker Lake
Benthos & Sediment Sampling 2008

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Project Coordinator:
Maggie McConnell
Azimuth Consulting Group Inc.
218-2902 West Broadway
Vancouver, BC, V6K 2G8
Telephone: 604-730-1220
Fax: 604-739-8511
Email: mmcconnell@azimuthgroup.ca

In case of **emergency**, contact Gary Mann (Azimuth telephone number 604-730-1220 or cell phone 604-908-0601).

LOCATION AND TIMING FOR FIELD ACTIVITIES:

Ten sampling stations have been chosen for benthos and sediment quality monitoring in the Meadowbank study lakes area. These stations (with their corresponding abbreviation) are:

- Third Portage Lake – North Basin (TPN)
- Third Portage Lake – East Basin (TPE)
- Third Portage Lake – South Basin (TPS)
- Second Portage Lake (SP)
- Tehek Lake (TE)
- Wally Lake (WAL)
- Inuggugayualik Lake (INUG)
- Baker Lake – Barge Dock (BBD)
- Baker Lake – Proposed Jetty (BPJ)
- Baker Lake – Akilahaarjuk Point (BAP)

Field activities are scheduled for once per year, in **late August**. The **target water depth** at each sampling station is approximately 8 to 10 meters; Wally Lake is the exception, with a total water depth of approximately 6 meters (target water depth is 5 to 6 meters). The **UTM coordinates** for each sampling station, measured using a GPS unit in NAD 83, and the range of water depths found at each station are presented in the following table:

Sampling Station	Easting	Northing	Water Depth (m)
TPN	14W 0637010	7215235	7.5 – 9.5
TPE	14W 0638754	7211349	7.5 – 10.5
TPS	14W 0633616	7208076	9.5 – 12
SP	14W 0639885	7213836	7 – 13.5
TE	15W 0360045	7212230	7.5 – 12

WAL	15W 0360882	7220815	6.5 – 8
INUG	14W 0622876	7216843	8 – 10
BBD	14W 0644508	7135305	9.5 – 13
BPJ	15W 0357109	7134123	8 – 13.5
BAP	15W 0363856	7131191	9.5 – 11.5

BENTHOS & SEDIMENT CHEMISTRY SAMPLING:

1. Gather **field collection materials**:
   In the boat:
   - Field collection data forms, waterproof paper, pencils, waterproof markers & clipboard
   - GPS unit, batteries
   - Depth meter, batteries
   - pH meter, batteries
   - Rope
   - Petite Ponar grab and rope
   - 500 micron (0.5 millimeter) stainless steel sieve
   - 2 stainless steel bowls
   - 2 stainless steel spoons
   - Liquinox detergent and dish cleaning brush
   - Plastic squirt bottle
   - Plastic bin (large enough to fit sieve easily)
   - Bucket
   - Sampling gloves
   - Safety glasses
   - Field sample jars & preservatives (per sampling station):
     - 3 – 120 mL glass jars (sediment samples)
     - 5 – 500 mL plastic jars (benthos)
     - 50% Formalin solution & calcium carbonate powder/pellets
   - QA/QC field duplicate sediment jars
   - Ashless filter paper & tweezers; 1-120 mL glass jar

   In camp:
   - Labels for sampling containers
   - Coolers, action packers (for storing and shipping samples)
   - Ice packs (for shipping sediment samples to lab)
   - Address labels for coolers
   - Chain-of-custody forms
   - Large Ziploc bags (for sending chain-of-custody form in coolers)
   - Electrical tape (for sealing benthos jars)
   - Packing tape (for affixing labels to sediment sample containers & sealing coolers)

2. Before going into the field, **label** all **sampling containers**. Using a permanent waterproof marker, complete the following information for the **sediment jars** on paper labels:
   - Azimuth company name
   - Station abbreviation (e.g. TPE, INUG)
   - Date of sample collection

- Parameters to be measured from individual jar (2 x 120 mL – total metals, PAHs, Oil&Grease; 1 x 120 mL – grain size, TOC)

Affix the labels to the sediment jars and then wrap packing tape around the labels to ensure a waterproof seal.

For the **benthos containers**, print the following information directly onto both the jar and jar lid using a permanent waterproof marker:

- Azimuth company name
- Station abbreviation (e.g. TPE, INUG) and replicate number (e.g. TPE-1, TPE-2); there are a total of 5 replicates per sampling station
- Date of sample collection

Prepare **internal labels** for each of the benthos containers. On a small piece of waterproof paper, write, using a lead pencil, the station abbreviation and replicate number (e.g. TPE-1). If no waterproof paper is available, use regular paper. Store the labels in their corresponding sampling container.

3. For **QAQC** purposes, sediment samples are collected in duplicate from one station every sampling event. All parameters measured in the original sample are measured in the field duplicate. The sampling station is selected randomly from one of the ten stations, and labeled as station DUP. Prepare the QAQC labels and affix to the sediment jars, as described in step 2. Label one new 120 mL glass jar with the Azimuth company name, date, QAQC filter and total metals.

4. A 100% formalin solution is equivalent to a solution of 37% formaldehyde. The **target formalin concentration** in each of the sampling containers is 10%. A neutral buffered formalin solution is achieved by adding a sufficient amount of calcium carbonate powder or pellets to render the solution pH neutral (pH = 7.0). Borax powder may be substituted for calcium carbonate powder if necessary.

   Transport Canada allows the free transport of formalin at concentrations less than 25% formaldehyde. Consequently, the formalin transported up to Meadowbank will be diluted in half (18.5% formaldehyde / 50% formalin solution).

   To **prepare** the **neutral buffered formalin**, add a small amount of calcium carbonate powder or pellets to the 50% formalin solution, seal the container and shake until mixed. Check the pH of the solution using the pH pen. Continue adding the powder/pellets until the pH of the solution reaches approximately 7.0. Store at room temperature until ready to use. Only prepare the required volume of neutral buffered formalin for that sampling event. Buffered formalin will not store for long periods of time.

   Follow all **safety precautions** when preparing the formalin solution. Formalin is a carcinogen and irritant. Wear sampling gloves and safety glasses when mixing the solution and prepare the solution in a well ventilated area.

5. Before and during the benthos and sediment sampling fill in the requested information on the **field data form**; complete one field data form in its entirety for each sampling station and sampling event. Forms are made of waterproof paper; **print** all information on the form using a **lead pencil** or write-in-the-rain pen.

6. With the aid of a GPS unit, **navigate the boat** to the sampling station using the UTM coordinates (in NAD 83) provided. Approach the station from downstream of the wind direction. In windy conditions, anchor the boat upstream of the station and drift back; it is not necessary to anchor the boat in calm conditions providing the boat remains within a 50 meter radius of the position. Do not allow the anchor to drag through the sampling station. Record the exact UTM coordinates on the field data form.

7. Measure the **water depth** at the sampling station using the 'Hawkeye' hand-held depth meter (note: place depth meter in water ***before*** pushing ON button). Hold the meter in the water, facing the lake bottom, until the meter measures the depth. Record this information on the field data form.

8. Begin collecting the benthos samples. Collecting the sediment first would disturb the benthic community. Place the large **plastic bin** in the center of the boat. Using the bucket, put several inches of water into the bin. This water is used to sieve the benthos samples.

9. Ensure the rope is securely attached to the **Ponar**. Rinse the Ponar grab, stainless steel bowl and spoon with lake water. **Wash** each of these items with liquinox soap by scrubbing with the dish cleaning brush and then thoroughly rinse with lake water. Put aside the stainless steel bowl and spoon until later (step 18).

10. Lower the **Ponar** to within 1 meter of the bottom of the lake. Lower the Ponar very slowly over the last meter and allow the rope to go slack. Raise the Ponar to the edge of the boat and check the grab for **acceptability**. The grab is acceptable if the sample:
    - does not contain large foreign objects;
    - has adequate penetration depth (i.e., 10-15 centimeters);
    - is not overfilled (sediment surface must not be touching the top of the Ponar);
    - did not leak (there is overlying water present in Ponar); and
    - is undisturbed (sediment surface relatively flat).

    Once the grab is deemed acceptable, open the Ponar jaws and drop the sample into the 500 micron sieve being held above the plastic bin in the center of the boat.

11. **Sieve the sample** until only the benthic organisms and coarse materials remain. To sieve the sample, gently raise and lower the sieve into the water in the plastic bin and swing side to side. Care must be taken to ensure the benthic organisms are not damaged or crushed. Do not disturb the sample to the point that it is splashing out of the sieve. Do not forcibly push materials through the sieve; gently break apart any small clay balls. Rinse off any pieces of larger plant material or rocks in the sample and discard.

12. **Flush** the **remaining sample** in the bottom of the sieve into the pre-labeled plastic sampling container (i.e. station-1 jar). A plastic squirt bottle filled with lake water is useful for this purpose.

13. **Repeat steps 10-12**, flushing the sample into the same pre-labeled plastic sampling container (i.e., station-1 jar). Ensure the sample is collected in an area not previously disturbed by the Ponar. The two independent grabs (per replicate) are composited to increase the surface area sampled.

14. **Rinse the sieve** to clear out any debris in the screen. To rinse, hold the sieve upside down and raise and lower the sieve into the water, either in the plastic bin or in the lake.

15. **Repeat steps 10-14** four more times; there must be a separation of 20 meters or more from other replicate stations. Record the depth and GPS coordinates of each replicate station on the field data form. Put the samples from each replicate in pre-labeled station replicate jars 2 through 5. In total, 10 Ponar grabs will be collected for benthos collection, two grabs per replicate.

16. Ensure internal labels are in each sample container. Shake the formalin to ensure all of the calcium carbonate powder is in solution. **Add** a sufficient volume of **formalin** to each sampling container to make a corresponding formalin solution of approximately 10%. Volumes of formalin are added by 'eye' (for a 10% solution, a ratio of 4 parts water and 1 part 50% formalin solution). Overall, there must be enough liquid in the jar to cover the entire sample. Seal the sample container securely and gently roll the container to mix the sample and formalin solution. Do not shake the sample container; this will crush the benthic organisms inside.

17. Begin collecting the sediment samples. Lower the **Ponar** to within 1 meter of the bottom of the lake, in an area not previously disturbed by the Ponar. Lower the Ponar very slowly over the last meter and allow the rope to go slack. Raise the Ponar to the edge of the boat and check the grab for **acceptability** (see step 10 for criteria).

18. Once the grab is deemed acceptable, open the top of the Ponar and remove any overlying water. Using the pre-cleaned stainless steel spoon, scoop out the **top 3-5 centimeters** of **sediment** and place in the pre-cleaned stainless steel bowl. Empty the remainder of the grab sample into a bucket in the boat, not directly into the lake, to ensure the area is not disturbed.

19. **Repeat steps 17** and **18** two more times, placing the sediment into the bowl with the other sediment sample(s).

20. **Homogenize** the sediment samples in the stainless steel bowl (by stirring with the spoon) until the sediment is thoroughly mixed. Scoop the sediment into pre-labeled sediment sampling containers. **Fill the jars** to the top and seal securely.

21. If this station is selected as the QAQC **field duplicate**, using the tweezers and a set of clean sampling gloves, **swipe** the stainless steel bowl and spoon with one piece of ashless **filter**

paper and store in the pre-labeled 120 mL glass jar. Collect the duplicate sediment sample from the same sediment collected in steps 17-20. Fill the sampling containers labeled as station DUP. Record that the QAQC samples were collected from this sampling station on the field data form.

22. **Complete** the **field data form**, including a description of the sediment (grain size, consistency, colour, presence of biota, sheen, unusual appearance) and the sampling effort (equipment failure, control of vertical descent of sampler) required to collect the benthos and sediment samples.

23. **Rinse** out the Ponar, stainless steel bowl and spoon with lake water. Dump the sediment and water from the plastic bin into the lake.

24. Until ready for shipping, store the **sediment samples and QAQC filter paper chilled** (on ice) in a cooler or in a refrigerator in camp, if space is available. Ice can usually be obtained from the local surroundings in early July. The sediment sampling containers may be put in plastic bags prior to storage on ice to further protect the labels from water damage. **Benthos samples** are stored in a cooler or action packer at **room temperature**.

25. Fill out a **chain-of-custody** form for the sediment samples being sent to **ALS Environmental**. The COC form must be completed carefully and in its entirety to ensure proper analysis. This includes listing all of the specific parameters to be analyzed (see step 2), Azimuth and ALS contact names, and checking off all of the specific boxes for requested analyses. The ALS laboratory quote number (**ALSEQ 07-622**) must be printed on the COC form to ensure proper billing.

    A digital COC form is available; this form can be filled out in advance to ensure accuracy and efficiency and amended in the field as required. However, using a digital copy of the COC requires printing 2 copies of the document in the field (one for the laboratory, one for Azimuth). Ensure printing services are available in camp prior to using the digital version of the form. Any questions regarding the COC form should be directed to the Azimuth project coordinator – Maggie McConnell. Put the completed COC form in a sealed ziploc plastic bag in the cooler with the water samples.

26. Fill out a **chain-of-custody** form for the benthos samples being sent to **Zaranko Environmental Assessment Services** (ZEAS). Complete all of the required fields and then put the form in a sealed ziploc plastic bag in the cooler with the benthos samples.

PACKAGING & SHIPPING SAMPLES:

1. Ensure all **sediment samples** are **sealed** securely. **Pack** sediment sampling containers upright in a cooler with ice packs, and packing material, to ensure containers do not break during transport. (Ideal storage and transport temperature is 4°C).

2. Ensure the COC form is enclosed and then seal the cooler(s). **Label the cooler**(s) with the following address:

   ALS Environmental
   1988 Triumph Street
   Vancouver, BC, Canada
   V5L 1K5
   Tel: 604-253-4188
   Attention: Natasha Marcovic-Mirovic

3. Ensure **benthos samples** are **sealed** securely. Wrap electrical tape around the edge of the lids to ensure a tight seal. **Pack** benthos sampling containers upright in a cooler or action packer; ensure the cooler/action packer is well packed so the jars are not able to move around.

4. Ensure the COC form is enclosed and then seal the cooler(s). **Label the cooler**(s) with the following address:

   Zaranko Environmental Assessment Services
   36 McCutcheon Avenue
   P.O. Box 1045
   Nobleton, ON
   L0G 1N0
   Tel: 905-859-7976

5. **Ship** the sediment **samples** to ALS Environmental as quickly as possible. Ship the benthos samples to ZEAS when convenient. Coordinate shipping with the camp manager.

6. Send completed **COC forms** and **field data forms** to **Azimuth** Consulting Group Inc., attention the project coordinator – Maggie McConnell.

Standard Operating Procedure
Meadowbank Study Lakes
Periphyton Sampling 2008

GENERAL:

Project Coordinator:
Maggie McConnell
Azimuth Consulting Group Inc.
218-2902 West Broadway
Vancouver, BC, V6K 2G8
Telephone: 604-730-1220
Fax: 604-739-8511
Email: mmccconnell@azimuthgroup.ca

In case of **emergency**, contact Gary Mann (Azimuth telephone number 604-730-1220 or cell phone 604-908-0601).

LOCATION AND TIMING FOR FIELD ACTIVITIES:

Seven stations have been chosen for periphyton monitoring in the Meadowbank study lakes area. These stations (with their corresponding abbreviation) are:

- Third Portage Lake – North Basin (TPN)
- Third Portage Lake – East Basin (TPE)
- Third Portage Lake – South Basin (TPS)
- Second Portage Lake (SP)
- Tehek Lake (TE)
- Wally Lake (WAL)
- Inuggugayualik Lake (INUG)

Field activities are scheduled for once per year, in **late August**. The **UTM coordinates** for each sampling station, measured using a GPS unit in NAD 83, and the range of water depths found at each station are presented in the following table:

Sampling Station	Easting	Northing	Water Depth (cm)
TPN	14W 0635635	7215462	5 – 45
TPE	14W 0639934	7210849	5 – 45
TPS	14W 0633774	7208286	5 – 35
SP	14W 0641016	7213346	5 – 20
TE	15W 0361837	7213265	5 – 35
WAL	15W 0360521	7222047	5 – 40
INUG	14W 0621980	7217467	5 – 40

PERIPHYTON SAMPLING:

1. Gather **field collection materials**:
   In the boat:
   - Field collection data forms, pencils, waterproof markers & clipboard
   - GPS unit, batteries
   - Periphyton sampler, syringes & plastic tubes
   - Binder clips (to pinch tubes on periphyton sampler)
   - Shoulder gloves (with 5 cm increments marked from fingertip to shoulder)
   - Field sample bottles & preservative (per sampling station):
     - 5 – 500 mL plastic jar
     - 1 syringe & Lugol's solution

   In camp:
   - Cooler(s) or action packer(s) (for storing and shipping samples)
   - Address labels for cooler(s)/action packer(s)
   - Chain-of-custody forms
   - Large Ziploc bag (for sending chain-of-custody form in cooler)
   - Packing tape (for sealing cooler)

2. Before going into the field, **label** all **sampling containers**. Using a permanent waterproof marker, print the following information directly onto both the jar and jar lid:
   - Azimuth company name
   - Station abbreviation (e.g. TPE, INUG) and replicate number (e.g. TPE-1, TPE-2); there are a total of 5 replicates per sampling station
   - Date of sample collection

3. Before and during sampling fill in the requested information on the **field data form**; complete one field data form in its entirety for each sampling station and sampling event. Forms are made of waterproof paper; **print** all information on the form using a **lead pencil** or write-in-the-rain pen.

4. Search the sampling area for a suitable location to sample flat rocks in less than 0.5 meters of water. Access to the area may be by boat or foot; in either event, ensure the sampling area is not impacted by boat (launch) or other anthropogenic activities. Record the exact **UTM coordinates** for each sampling station, measured using a GPS unit in NAD 83, on the field data form. In future sampling events, sample periphyton from the same locations.

5. Choice of rock is very important. **Select** a **rock** with a **flat** surface, no more than 0.5 meters below the water surface, with the following criteria:
   - Facing up as much as possible; if not, with a small slope
   - uniform algal coverage, not uniformly dense or sparse

   Measure the **water depth** of each rock selected; a set of shoulder gloves with 5 cm increments marked from fingertip to shoulder works well for this purpose. Record this information on the field data form.

6. The periphyton sampler is a specially designed scrubber, consisting of a plexiglass tube with a plunger that fits snugly inside and a distal wire brush that is in direct contact with the rock surface. Press the tube against the rock to form a tight seal. To **detach** the **periphyton colonies**, depress the plunger and twist for approximately 30 half turns. The periphyton mixture is suspended (i.e. by opening the plunger approximately ¼ of the device volume) and drawn into a syringe that is attached to the tube (pinch intake tube closed when drawing suspension into syringe). Empty the syringe (pinch output tube closed prior to detaching the syringe) into the pre-labeled replicate 1 sampling container (i.e. TPE-1). Continue scraping and syringing (approximately 2 times: another 20 half turns of the sampler, then 10 half turns, then a final rinse of sampler) until all visible periphyton are completely removed from the rock surface. (This procedure works well with two people; one to scrape the rocks and clamp the intake tube, the other to operate the syringe and clamp the output tube; a third person may be useful to record notes and hold the sample jar, as at many locations it is not possible to put the jar down.)

7. **Repeat steps 5 and 6** two more times, selecting undisturbed flat rocks in less than 0.5 meters depth of water. Put the collected periphyton samples from each rock into the same pre-labeled replicate 1 sampling container (i.e. TPE-1) as above. These 3 rocks are composited into one replicate sample; approximately 500 mL of water/periphyton are collected in total.

8. **Repeat steps 5, 6 and 7** four more times, selecting undisturbed flat rocks in less than 0.5 meters depth of water. Put the samples from each replicate in pre-labeled station replicate jars 2 through 5. In total, 15 rocks will be sampled; 5 replicate samples comprised of 3 rocks each.

9. For each 125 mL of periphyton mixture in each sampling container, **add** 1 mL of **Lugol's solution** to preserve the sample (the sample should look the colour of weak tea). Seal the sampling containers and **store** in a cooler at **room temperature**.

10. **Complete** the **field data form**, including a description of the substrate characteristics and the sampling effort required to collect the periphyton samples.

11. Fill out a **chain-of-custody** form for the periphyton samples being sent to **Plankton R Us Inc.**, Winnipeg, MB. Complete all of the required fields and then put the COC form in a sealed ziploc plastic bag in the cooler(s)/action packer(s) with the periphyton samples.

    When using digital COC forms, fill out the form in advance to ensure accuracy and efficiency and amend in the field as required. Note that using a digital copy of the COC requires printing 2 copies of the document in the field (one for the laboratory, one for Azimuth). Ensure printing services are available in camp prior to using the digital version of the form. Any questions regarding the COC form should be directed to the Azimuth project coordinator – Maggie McConnell.

PACKAGING & SHIPPING SAMPLES:

1. Ensure **periphyton samples** are **sealed** securely and **pack** in cooler(s)/action packer(s) with sufficient packing material to ensure samples remain upright and do not leak during transport. It is not necessary to keep samples cool.

2. Ensure the COC form is enclosed and then seal the cooler(s)/action packer(s). **Label the cooler(s)/action packer(s)** with the following address:

   Dr. David Findlay
   Plankton R Us Inc.
   39 Alburg Drive
   Winnipeg, MB
   R2N 1M1
   Tel: 204-254-7952

3. **Ship** the **samples** when convenient. Coordinate shipping with the camp manager.

4. Send completed **COC forms** and **field data forms** to **Azimuth** Consulting Group Inc., attention the project coordinator – Maggie McConnell.